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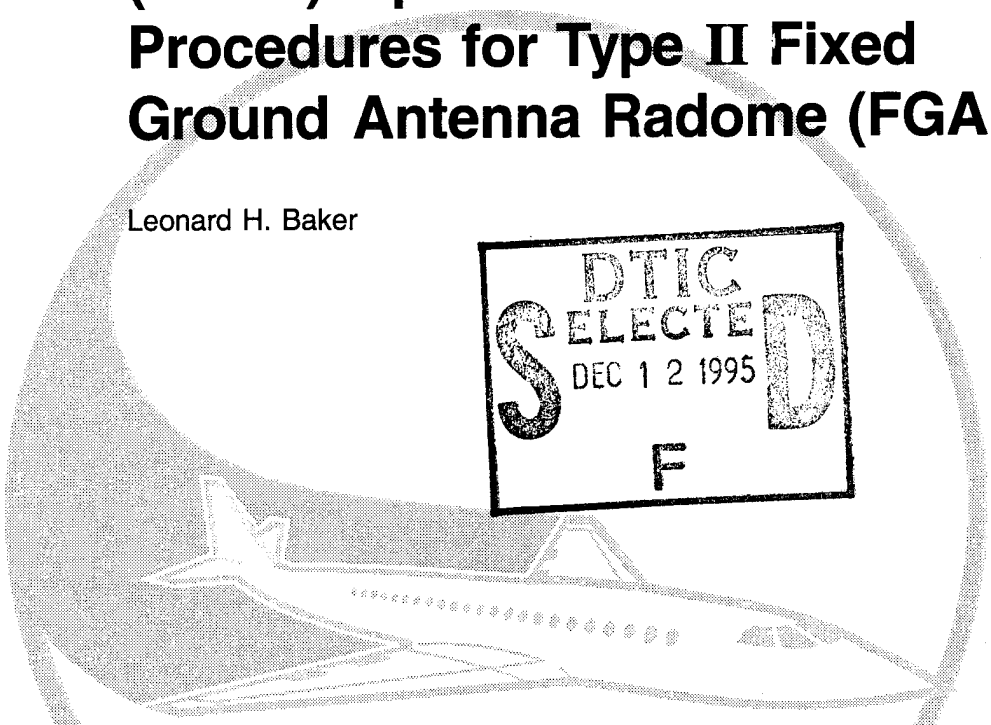
Operational Test and Evaluation (OT&E) Operational Test Procedures for Type II Fixed Ground Antenna Radome (FGAR)

Leonard H. Baker



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16. Abstract

This document defines the Type II Fixed Ground Antenna Radome (FGAR) Operational Test and Evaluation (OT&E) operational test procedures that will be performed at Federal Aviation Administration (FAA) field facilities. These test procedures will be performed following the Contractor's Acceptance Inspection (CAI) and the facilities have been returned to operational service. The OT&E testing will be limited to electromagnetic performance evaluation and human engineering.

The Type II FGAR, including the base ring, is specially designed to be mounted on a standard Beacon Only Site (BOS) antenna tower. The Type II FGARs will be installed principally at facilities which will receive a Mode Select Beacon System (Mode S). In addition, they will be installed at some Air Traffic Control Radar Beacon System (ATCRBS) sites which require environmental protection due to local conditions. A Type II FGAR will also be installed at the Lihue, Hawaii (HI), Terminal Radar Facility.

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1. INTRODUCTION.

The objectives of Operational Test and Evaluation (OT&E) testing are to verify the Fixed Ground Antenna Radome (FGAR) does not degrade the electromagnetic performance of the Air Traffic Control Radar Beacon System (ATCRBS)/Mode Select Beacon System (Mode S) and Airport Surveillance Radar (ASR)-8 antennas; and that it meets the other criteria specified in the OT&E Test Plan and the Test and Evaluation (T&E) Master Plan (TEMP) Test Verification Requirements Traceability Matrix (TVRTM).

Type II FGAR OT&E Operational testing will be performed at three different facilities. These three facilities are representative of the system/antenna configurations where the Type II FGAR will be installed. There is, however, only one Type II FGAR First Article.

The first Type II FGAR will be installed at the Rockville, Nebraska (NE) Beacon Only Site (BOS) [QJM], and will be considered the First Article site. The OT&E Operational testing will be limited to electromagnetic performance testing using "live" aircraft (targets of opportunity) beacon data. The data will be collected and analyzed by the Minneapolis (ZMP), Denver (ZDV), and Kansas City (ZKC) Air Route Traffic Control Centers (ARTCC).

The second Type II FGAR to be tested will be the Lihue, Hawaii (HI) Terminal Radar Facility (LIH). OT&E Operational testing will include: (1) collecting Common Digitizer (CD)-1 data at the facility, and (2) Air Traffic Control Specialists (ATCS) at the Honolulu Combined Center/Radar Approach Control (CERAP) [ZHN] and Lihue Airport Traffic Control Tower (ATCT) [LIH] evaluating the video data on their displays

The third Type II FGAR to be tested will be the Samburg, Tennessee (TN) BOS (QPB). This site is not scheduled to receive a Mode S system and will retain its original ATCRBS antenna. Testing will be limited to electromagnetic performance testing using "live" aircraft (targets of opportunity) beacon data. The data will be collected and analyzed by the Memphis (ZME) and Kansas City (ZKC) ARTCCs.

2. REFERENCE DOCUMENTS.

2.1 FEDERAL AVIATION ADMINISTRATION (FAA) ORDERS.

Order 1814.4B	FAA NAS Test and Evaluation Policy
Order 6100.1C	Maintenance of NAS En Route Stage A Air Traffic Control System
Order 6190.10	Maintenance of En Route Automated Radar Tracking System

2.2 FAA STANDARDS.

FAA-STD-024b	Content and Format Requirements for the Preparation of Test and Evaluation Documentation

2.3 FAA SPECIFICATIONS.

FAA-E-2773b	Specification for Fixed Ground Antenna Radome (Mode S Compatible)

2.4 NATIONAL AIRSPACE SYSTEM (NAS) DOCUMENTS.

NAS-MD-691	On-Line Certification and Diagnostics

2.5 OTHER FAA DOCUMENTS.

DTFA01-93-C-0085	Fixed Ground Antenna Radome (FGAR) Contract
DOT/FAA/CT-TN93/17	Fixed Ground Antenna Radome (FGAR) Master Test and Evaluation Plan (TEMP)
DOT/FAA/CT-TN95/23	Fixed Ground Antenna Radome (FGAR) Type I/III OT&E Integration and OT&E Operational Final Test Report
DOT/FAA/CT-TN95/53	Operational Test and Evaluation (OT&E) Operational Test Plan for Type II Fixed Ground Antenna Radome (FGAR)
FAA-4306B-8H	User's Manual - Common Digitizer Data Reduction (COMDIG) Program
FAA-4306N-6H	User's Manual - Quick Analysis of Radar Sites (QARS) Program
FAA-4306P-9H	User's Manual - Beacon False Target Analysis (BFTA) Program
SPB-TRA-009	New Radar Analysis Software for Transportable Radar Analysis Computer System

3. SYSTEM DESCRIPTION.

3.1 SYSTEM OVERVIEW.

The FGAR supplies optimal protection from the outside environment while providing minimal degradation to the electromagnetic performance characteristics of the enclosed antenna(s). The hardware required for installation, i.e., cables, wiring, support equipment, radome mounted/ supported equipment, radome base ring (Type II only), and spare parts are part of the FGAR procurement. There are five types of radomes (no Type IV radomes are being procured). They are the following:

a. Type I Radome.

This type of radome will provide an environmental enclosure for a collocated L-band surveillance radar parabolic reflector and top-mounted dual-faced L-band beacon phased array antenna. The radome will be capable of withstanding wind velocities of 150 miles per hour (MPH). They will have an inside diameter of 59 feet at their widest point, and will fit a base-ring diameter equal to the present CW-396A radome. The enclosed antennas will rotate at a speed of either 5 or 6 revolutions per minute (RPM).

b. Type II Radome.

This type of radome will provide an environmental enclosure for a dual-faced L-band beacon phased array antenna consisting of two identical rectangular back-to-back antennas approximately 6 feet high by 27 feet wide, rotating at speeds up to 5 RPM. The radome will be capable of withstanding wind velocities of 150 MPH and

have an inside diameter of 35 feet at its widest point. It will fit the standard beacon-only antenna platform.

c. Type III Radome.

This type of radome will be identical to the Type I in all respects, except that it will be capable of withstanding wind velocities of 100 MPH maximum.

d. Type V Radome.

This type of radome will provide an environmental enclosure for a collocated L-band radar reflector and top-mounted dual-faced L-band beacon phased array antenna. The radome will be capable of withstanding wind velocities of 150 MPH. They will have an inside diameter of 57.5 feet at their widest point, and will fit a base-ring diameter equal to the present Air Route Surveillance Radar (ARSR)-3 radome.

e. Type VI Radome.

This type of radome will be identical to the Type V in all respects, except that it will be capable of withstanding wind velocities of 100 MPH maximum.

3.2 INTERFACES OVERVIEW.

3.2.1 Mechanical Interface.

a. The Type I/III and V/VI FGARs interface mechanically with the existing antenna tower radome base ring.

b. The Type II FGAR radome base ring is part of the procurement and interfaces with the antenna tower.

3.2.2 Electrical Interface.

All types of FGARs interface electrically with the following facility systems:

a. Electrical system.

b. Lightning protection system.

c. Remote Maintenance Monitoring System (RMMS)/Environmental Remote Monitoring Subsystem (ERMS).

d. Transient protection.

A block diagram of the Type II interfaces are shown in figure 3.2.2-1.

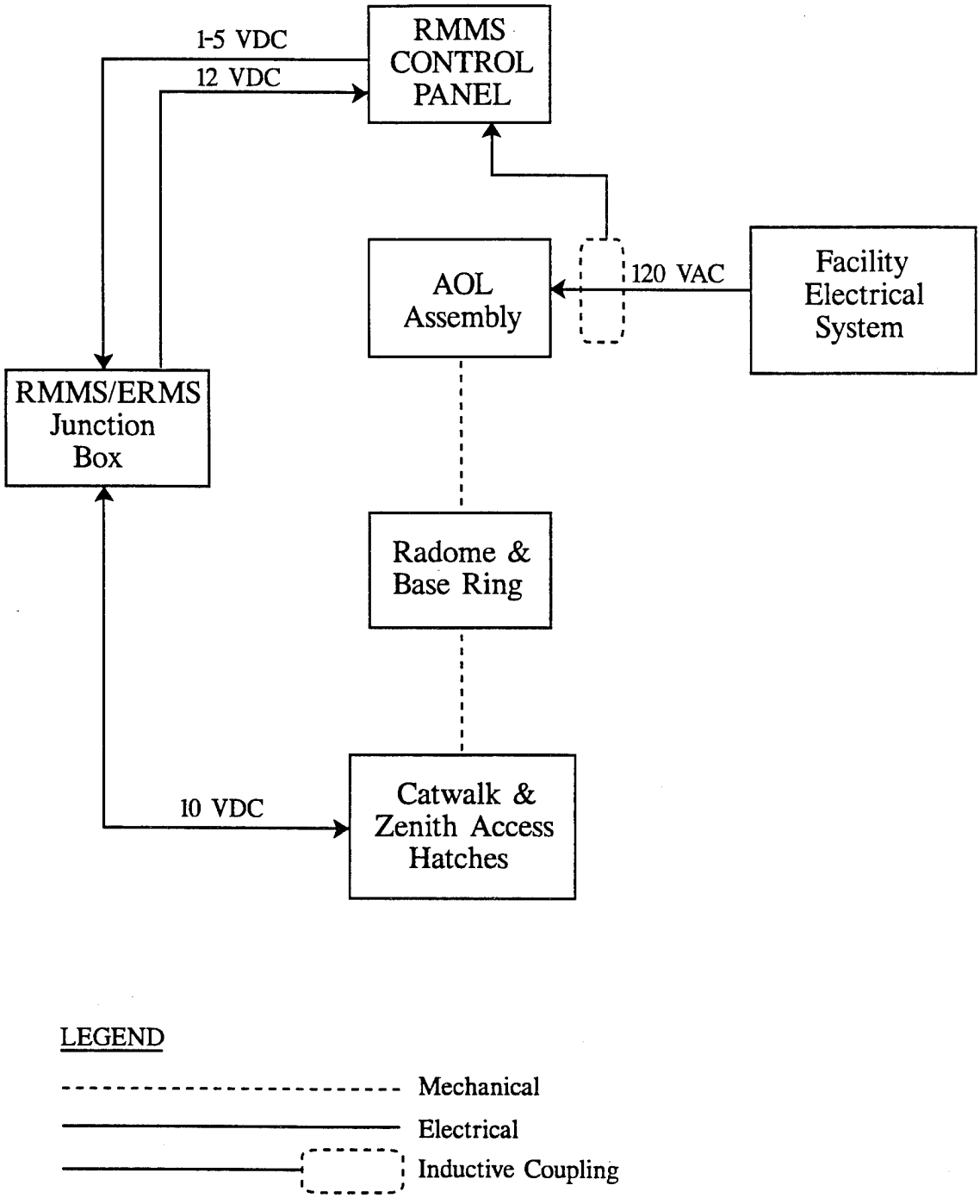

FIGURE 3.2.2-1. TYPE II FGAR INTERFACES BLOCK DIAGRAM

4. TEST MANAGEMENT.

4.1 TEST DIRECTOR.

A Test Director (TD) will be appointed to supervise the testing. The TD's duties include:

a. Scheduling the required test facilities (see appendix A).

b. Collection of test data, e.g., computer printouts, etc.

c. Analysis of test data and documentation.

4.2 COORDINATION.

The TD will be responsible for coordinating activities, e.g., Air Traffic Control (ATC) and Airway Facilities (AF), at:

a. Rockville BOS (QJM).

The Minneapolis (ZMP), Denver (ZDV), and Kansas City (ZKC) ARTCCs.

b. Lihue Terminal Radar Facility (LIH).

The Honolulu CERAP (ZHN), Lihue ATCT (LIH), and Lihue Terminal Radar Facility (LIH).

c. Samburg BOS (QPB).

The Memphis (ZME) and Kansas City (ZKC) ARTCCs.

4.3 DEVIATIONS.

Not applicable.

4.4 DATA ELEMENTS.

Not applicable.

4.5 DATA BASE DESIGN AND STRUCTURE.

Not applicable.

4.6 INITIAL SETUP/CONFIGURATION.

a. Prior to commencing OT&E Operational testing, the contractor must have:

1. Completed the installation of the FGAR.

2. Removed any scaffolding, cranes, etc., required for its installation.

3. Completed the Site Acceptance Test (SAT).

4. Completed the Contractor Acceptance Inspection (CAI).

b. In addition:

1. Rockville BOS (QJM).

(a) The contractor must have completed the First Article Design Qualification Test (DQT).

(b) The FAA must have:

(1) Completed alignment of the Mode S back-to-back antenna.

(2) Completed the recommissioning flight check.

2. Lihue Terminal Radar Facility (LIH).

The FAA must have:

(a) Completed alignment of the ASR-8 and ATCRBS antennas.

(b) Optimized the operation of the ASR-8, Air Traffic Control Beacon Interrogator (ATCBI)-4, and CD-1.

(c) Performed the commissioning flight check.

4.7 TEST PERSONNEL REQUIREMENTS.

The personnel required for the testing are:

a. Rockville BOS (QJM).

Technical Support Staff (TSS)/Service Management Operations Center (SMOC) personnel and HOST Computer System (HCS) operators at the Minneapolis (ZMP), Denver (ZDV), and Kansas City (ZKC) ARTCCs.

b. Lihue Terminal Radar Facility (LIH).

1. ATCSs at the Honolulu CERAP (ZHN) and Lihue ATCT (LIH).

2. Radar and environmental technicians at the Lihue Terminal Radar Facility (LIH).

3. FAA Technical Center, ACT-300, engineers.

c. Samburg BOS (QPB).

TSS personnel and HCS operators at the Memphis (ZME) and Kansas City (ZKC) ARTCCs.

4.8 TEST SUPPORT HARDWARE, SOFTWARE, AND DOCUMENTATION.

The hardware and software required to support the testing are:

a. Rockville BOS (QJM).

1. Rockville BOS (QJM) ATCBI-5.

2. Minneapolis (ZMP), Denver (ZDV), and Kansas City (ZKC) ARTCC HCSs.

3. The QARS, BFTA, and COMDIG programs (see appendix B).

b. Lihue Terminal Radar Facility (LIH).

1. Lihue Terminal Radar Facility (LIH) ASR-8, ATCBI-4, and CD-1.

2. Lihue ATCT (LIH) ATCS displays.

3. Honolulu CERAP (ZHN) ATCS displays.

4. International Business Machines (IBM) compatible, 386, 486, or Pentium personal computer (PC) with an MX-6A interface card installed.

5. The following Transportable Radar Analysis Computer System (TRACS) programs (see appendix B):

(a) PLOTASR.

(b) Real-Time Aircraft Display System (RTADS).

(c) TRACS Data Reduction (TDR):

(1) Beacon False Target Summary (BFTS).

(2) Permanent Echo (PE) Accuracy.

(3) Permanent Echo Accuracy Merge.

(4) Surveillance Analysis.

c. Samburg BOS (QPB).

1. Samburg BOS (QPB) ATCBI-5.

2. Memphis (ZME) and Kansas City (ZKC) ARTCC HCSs.

3. The QARS, BFTA, and COMDIG programs (see appendix B).

4.9 DATA COLLECTION, RECORDING, AND REDUCTION.

The data collection, recording, and reduction will be accomplished as follows:

a. Rockville BOS (QJM).

The Minneapolis (ZMP), Denver (ZDV), and Kansas City (ZKC) ARTCCs TSS/SMOC personnel will run the QARS, BFTA, and COMDIG programs on their HCS using beacon data from the Rockville BOS (QJM).

b. Lihue Terminal Radar Facility (LIH).

1. Electromagnetic Performance.

(a) ATCSs at the Lihue ATCT (LIH) and Honolulu CERAP (ZHN) will evaluate the video data on their displays and record the results on FGAR-2(XXX)/II forms.

(b) Primary (ASR-8) and secondary (ATCRBS) radar electromagnetic performance data will be recorded at the output of the CD-1 on floppy disks, using an IBM compatible PC and the TRACS RTADS program. The floppy disks will be forwarded to the TD for analysis by Technical Center, ACT-300, engineers.

2. Human Engineering.

Human engineering test data will be recorded on the FGAR-10(LIH)/II form. When the testing is completed, the form will be forwarded to the TD for analysis.

c. Samburg BOS (QPB).

The Memphis (ZME) and Kansas City (ZKC) ARTCCs TSS personnel will run the QARS, BFTA, and COMDIG programs on their HCS using beacon data from the Samburg BOS (QPB).

4.10 ANALYSIS METHODS.

The data analysis will be accomplished as follows:

a. Rockville BOS (QJM).

The Minneapolis (ZMP), Denver (ZDV), and Kansas City (ZKC) ARTCCs TSS/SMOC personnel supporting the test will analyze the data supplied by the QARS, BFTA, and COMDIG programs. When the analysis has been completed, they will prepare a report and forward it to the TD.

b. Lihue Terminal Radar Facility (LIH).

1. Electromagnetic Performance

(a) The TD will analyze the FGAR-2(XXX)/II forms completed by the Honolulu CERAP (ZHN) and Lihue ATCT (LIH) ATCSs.

(b) The ACT-300 engineers supporting the test will analyze the data recorded, utilizing the TRACS TDR programs (see appendix B).

2. Human Engineering.

The TD will analyze the FGAR-10(LIH)/II form to verify a trained technician can obtain access to the Zenith Service Hatch and performance maintenance.

c. Samburg BOS (QPB).

The Memphis (ZME) and Kansas City (ZKC) ARTCCs TSS personnel supporting the test will analyze the data supplied by the QARS, BFTA, and COMDIG programs. When the analysis has been completed, they will prepare a report and forward it to the TD.

5. ACRONYMS.

ACP	Azimuth Change Pulse (QARS program)
AF	Airway Facilities
AFSFO	Airway Facilities Sector Field Office
ALT	Altitude (QARS program)
AOL	Aircraft Obstruction Light(s)
ARSR	Air Route Surveillance Radar
ARTCC	Air Route Traffic Control Center
ASPLT	Azimuth Split (QARS program)
ASR	Airport Surveillance Radar
ATC	Air Traffic Control
ATCBI	Air Traffic Control Beacon Interrogator
ATCRBS	Air Traffic Control Radar Beacon System
ATCS	Air Traffic Control Specialist
ATCT	Airport Traffic Control Tower
AZ	Azimuth (QARS program)
BCN	Beacon (QARS program)
BFTA	Beacon False Target Analysis (computer program)
BFTS	Beacon False Target Summary (TRACS TDR program)
BLIP	Blip/Scan Ratio (QARS program)
BOS	Beacon Only Site
CAI	Contract Acceptance Inspection
CD	Common Digitizer
CDRECORD	Common Digitizer Record (computer program)
CERAP	Combined Center/Radar Approach Control
COLL	Collimation (QARS program)
COMDIG	Common Digitizer Data Reduction (computer program)
CPME	Calibration Performance Monitoring Equipment
CW	Radomes (military designation)
DEV	Deviation (QARS program)
DQT	Design Qualification Test

DT&E	Development Test and Evaluation
ERMS	Environmental Remote Monitoring Subsystem
ESSCO	Electronic Space Systems Corporation (company name)
FAA	Federal Aviation Administration
FALSE-BCN	False Beacon (QARS program)
FGAR	Fixed Ground Antenna Radome
HI	Hawaii
HCS	HOST Computer System
HOST	Air Traffic Control HOST Computer System (not an acronym)
IBM	International Business Machines (company name)
ID	Identification (TRACS TDR BFTS program)
LIH	Lihue Airport Traffic Control Tower (identifier)
LIH	Lihue Terminal Radar Facility (identifier)
M3REL	Mode 3/A Reliability Percentage (QARS program)
M3VAL	Mode 3/A Validity Percentage (QARS program)
MA	Massachusetts
MCREL	Mode C Reliability Percentage (QARS program)
MCVAL	Mode C Validity (QARS program)
Mode S	Mode Select Beacon System
MOE	Measures of Effectiveness
MOP	Measures of Performance
MPH	Miles Per Hour
MTI	Moving Target Indicator (QARS program)
NAS	National Airspace System
NE	Nebraska
NML	Normal (QARS program)
OT&E	Operational Test and Evaluation
PC	Personal Computer
PE	Permanent Echo
PLOTASR	PLOTASR (TRACS program, not an acronym)
QARS	Quick Analysis of Radar Sites (computer program)

QJM	Rockville Beacon Only Site (identifier)
QPB	Samburg Beacon Only Site (identifier)
R/R	Radar Reinforced (QARS program)
RAR	Ring-A-Round (QARS program)
REF	Reflections (QARS program)
RMMS	Remote Maintenance Monitoring System
RPM	Revolutions Per Minute
RSPLT	Range Split (QARS program)
RTADS	Real-Time Aircraft Display System (TRACS program)
SAT	Site Acceptance Test
SCAN	Blip/Scan Ratio (QARS program)
SCH	Combined Moving Target Indicator and Normal Video (QARS program)
SMOC	Service Management Operations Center
T&E	Test and Evaluation
TD	Test Director
TDR	Test Discrepancy Report
TDR	TRACS Data Reduction (TRACS program)
TEMP	Test and Evaluation Master Plan
TN	Tennessee
TRACS	Transportable Radar Analysis Computer System (computer program)
TSS	Technical Support Staff
TVRTM	Test Verification Requirements Traceability Matrix
VAC	Volts Alternating Current
VDC	Volts Direct Current
ZDV	Denver Air Route Traffic Control Center (identifier)
ZHN	Honolulu Combined Center/Radar Approach Control (identifier)
ZKC	Kansas City Air Route Traffic Control Center (identifier)
ZME	Memphis Air Route Traffic Control Center (identifier)
ZMP	Minneapolis Air Route Traffic Control Center (identifier)
ZER	Code Zero Percentage (QARS program)

APPENDIX A

TEST PROCEDURES

TEST PROCEDURES

1. TEST TITLE.

LHAT-1 Lihue ATCT (LIH) Air Traffic Control Specialist (ATCS) Evaluation Test

1.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the apparent strength of targets, loss of targets, or other changes of the primary (ASR-8) and secondary (ATCBI-4) video data presented to the ATCSs, without a radome and with the FGAR installed. The test will use targets of opportunity.

1.2 MEASURES OF EFFECTIVENESS (MOE).

The FGAR does not degrade the primary (ASR-8) or secondary (ATCBI-4) radar video data presented to the ATCSs.

1.3 MEASURES OF PERFORMANCE (MOP).

The primary (ASR-8) and secondary (ATCBI-4) radars video data strength appears the same to the ATCSs, lost/coasting targets do not increase, etc.

1.4 EVALUATION CRITERIA.

The primary (ASR-8) and secondary (ATCBI-4) video data appears the same to the ATCSs. The number of lost/coasting targets does not increase. No other anomalies appear.

1.5 PROCEDURES.

a. LHAT-1, Lihue ATCT (LIH) ATCS Evaluation Test.

1. The ATCSs will evaluate the presentation of targets of opportunity on their displays.

2. The ATCSs will complete the ATCS EVALUATION QUESTIONNAIRE, FGAR-2(LIH)/II form.

b. Data Analysis.

When the FGAR-2(LIH)/II forms have been completed they will be forwarded by the Manager, Lihue ATCT (LIH), or his designated representative, to the TD.

2. TEST TITLE.

LHAT-2 Honolulu CERAP (ZHN) Air Traffic Control Specialist (ATCS) Evaluation Test

2.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the apparent strength of targets, loss of targets, or other changes of the primary (ASR-8) and secondary (ATCBI-4) video data presented to the ATCSs, without a radome and with the FGAR installed. The test will use targets of opportunity.

2.2 MOE.

The FGAR does not degrade the primary (ASR-8) or secondary (ATCBI-4) radar video data presented to the ATCSs.

2.3 MOP.

The primary (ASR-8) and secondary (ATCBI-4) radars video data strength appears the same to the ATCSs, lost/coasting targets do not increase, etc.

2.4 EVALUATION CRITERIA.

The primary (ASR-8) and secondary (ATCBI-4) video data appears the same to the ATCSs. The number of lost/coasting targets does not increase. No other anomalies appear.

2.5 PROCEDURES.

a. LHAT-2, Honolulu CERAP (ZHN) ATCS Evaluation Test.

1. The ATCSs will evaluate the presentation of targets of opportunity on their displays.

2. The ATCSs will complete the ATCS EVALUATION QUESTIONNAIRE, FGAR-2(ZHN)/II form.

b. Data Analysis.

When the FGAR-2(ZHN)/II forms have been completed they will be forwarded by the Manager, Honolulu CERAP (ZHN), or his designated representative, to the TD.

3. TEST TITLE.

LHEP-1A/B Lihue Terminal Radar Facility (LIH) Electromagnetic Performance Test

3.1 TEST OBJECTIVE.

The objective is to collect primary (ASR-8) and secondary (ATCBI-4) electromagnetic performance data and determine if there are any differences. A comparison will be made between the data recorded without a radome, to that recorded after the FGAR is installed.

3.2 MOE.

The FGAR does not affect the accuracy of the data being transmitted to the Honolulu CERAP (ZHN), from the primary (ASR-8) or secondary (ATCBI-4) radars.

3.3 MOP.

The accuracy of the primary (ASR-8) and secondary (ATCBI-4) radars data being transmitted to the Honolulu CERAP (ZHN) is the same, before and after the FGAR is installed.

3.4 EVALUATION CRITERIA.

There are no changes in the accuracy of the data being transmitted to the Honolulu CERAP (ZHN), from the primary (ASR-8) or secondary (ATCBI-4) radars, without a radome or after the FGAR is installed.

3.5 PROCEDURES.

a. LHEP-1A, No Radome Installed - Lihue Terminal Radar Facility (LIH) Electromagnetic Performance Test.

1. Radar technicians at the Lihue Terminal Radar Facility (LIH) will record primary (ASR-8) and secondary (ATCBI-4) electromagnetic performance data. The data will be recorded during periods of high aircraft traffic, for a period of at least 15 days.

2. The data will be recorded at the output of the CD-1, using an IBM compatible PC with an MX-6A interface card installed, on floppy disks.

3. The electromagnetic performance data will be recorded using the TRACS RTADS program, in Common Digitizer Record (CDRECORD) format (see appendix B).

4. The data will be recorded after the FAA has:

(a) Completed the alignment of the ASR-8 and ATCRBS antennas.

(b) Optimized the operation of the ASR-8, ATCBI-4, and CD-1.

(c) Performed the commissioning flight check.

5. When the data recording has been completed, the Manager, Lihue Airway Facilities Sector Field Office (AFSFO), or a designated representative, will forward the floppy disks to the TD.

b. LHEP-1B, FGAR Installed - Lihue Terminal Radar Facility (LIH) Electromagnetic Performance Test.

1. Radar technicians at the Lihue Terminal Radar Facility (LIH) will record primary (ASR-8) and secondary (ATCBI-4) electromagnetic performance data. The data will be recorded during periods of high aircraft traffic, for a period of at least 15 days.

2. The data will be recorded at the output of the CD-1, using an IBM compatible PC with an MX-6A interface card installed.

3. The electromagnetic performance data will be recorded using the TRACS RTADS program in CDRECORD format (see appendix B).

4. The data will be recorded after the contractor has:

(a) Completed the installation of the FGAR.

(b) Removed any scaffolding, cranes, etc., required for its installation.

(c) Completed the SAT.

(d) Completed the CAI.

5. When the data recording has been completed, the floppy disks will be forwarded to the TD.

c. Data Analysis.

Upon receipt of the floppy disks containing the electromagnetic performance data, ACT-300 engineers will use the TRACS TDR programs to analyze the data. They will then compare the data recorded without a radome to that recorded after the FGAR was installed.

4. TEST TITLE.

LHHE-1 Lihue Terminal Radar Facility (LIH) Human Engineering Test

4.1 TEST OBJECTIVE.

The objective is to verify environmental technicians can replace lamps in the Aircraft Obstruction Light (AOL) assembly and perform other required maintenance tasks on the Zenith Hatch Assembly mounted equipment.

4.2 MOE.

Zenith Hatch Assembly mounted devices can be maintained by environmental technicians.

4.3 MOP.

AOL assembly lamps and other Zenith Hatch Assembly devices can be maintained.

4.4 EVALUATION CRITERIA.

Zenith Hatch Assembly mounted devices, e.g., AOL lamps, etc., can be serviced, removed, and/or replaced by environmental technicians.

4.5 PROCEDURES.

a. LHHE-1, Lihue Terminal Radar Facility (LIH) Human Engineering Test.

An environmental technician will:

1. Put on the safety harness provided with the FGAR.
2. Climb the back of the ASR-8 antenna, using the steps provided.
3. Place the ladder provided with the FGAR, between the platform at the top of the ASR-8 antenna and the Zenith Service Hatch. (The hooks at the top of the ladder will be placed over the bar mounted in the Zenith Service Hatch opening.)
4. Climb the ladder to the Zenith Service Hatch.
5. Connect the safety harness to the safety lanyard/Personal Anchor Point at the zenith of the FGAR.
6. Unlatch and open the Zenith Service Hatch.
7. Simulate replacement of the AOL lamps.
8. Close and latch the Zenith Service Hatch.
9. Disconnect the safety harness from the safety lanyard/Personal Anchor Point.
10. Climb down the ladder to the ASR-8 antenna.
11. Remove and store the ladder.
12. Climb down the ASR-8 antenna.

b. The technician performing the test, or other designated individual, will complete the FGAR-6/II, FGAR-7/II, FGAR-8/II, and FGAR-10(LIH)/II forms. The Manager, Lihue AFSFO, or a designated representative, will forward the completed forms to the TD.

c. Data Analysis.

The TD will analyze the completed FGAR-6/II, FGAR-7/II, FGAR-8/II, and FGAR-10(LIH)/II forms.

5. TEST TITLE.

RKDV-1A/B Denver ARTCC (ZDV)/Rockville BOS (QJM) QARS Program Test

5.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the performance characteristics of the ATCRBS/Mode S beacon data received from the Rockville BOS (QJM).

5.2 MOE.

The FGAR does not affect the accuracy of the beacon data received from the ATCRBS/Mode S.

5.3 MOP.

The accuracy of the ATCRBS/Mode S beacon data being received by the ARTCC is the same, before and after the FGAR is installed.

5.4 EVALUATION CRITERIA.

There is no change in the accuracy of the beacon data received from the ATCRBS/Mode S, without a radome or with the FGAR installed.

5.5 PROCEDURES.

a. RKDV-1A, No Radome Installed - Denver ARTCC (ZDV) QARS/Rockville BOS (QJM) Program Test.

1. The ARTCC HCS operators will run the QARS program on beacon data received from the Rockville BOS (QJM).

2. The QARS program printouts will be given to the SMOC personnel for analysis.

b. RKDV-1B, FGAR Installed - Denver ARTCC (ZDV)/Rockville BOS (QJM) QARS Program Test.

1. The ARTCC HCS operators will run the QARS program on beacon data received from the Rockville BOS (QJM), after:

(a) The contractor has:

(1) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(2) Completed the First Article DQT.

(3) Completed the SAT.

(4) Completed the CAI.

(b) The FAA has:

(1) Completed alignment of the Mode S back-to-back antenna.

(2) Completed the recommissioning flight check.

2. The QARS program printouts will be given to the SMOC personnel for analysis.

c. Data Analysis.

When the QARS program has been run on beacon data without a radome and after the FGAR has been installed, the SMOC personnel will compare the data to determine if there are any changes in the accuracy or any other anomalies. Upon completion of the analysis, the SMOC personnel will submit a report to the TD, with copies of the QARS summary sheets.

6. TEST TITLE.

RKDV-2A/B Denver ARTCC (ZDV)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test

6.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the number and/or types of beacon false targets, i.e., splits, ring-around, reflections, etc., in the ATCRBS/Mode S data received from the Rockville BOS (QJM).

6.2 MOE.

The FGAR does not increase the number of beacon false targets included in the data received by the ARTCC.

6.3 MOP.

The number of beacon false targets are the same or less, after the FGAR is installed.

6.4 EVALUATION CRITERIA.

The number of beacon false targets in the data received by the ARTCC is either the same or less than the number received before the FGAR was installed.

6.5 PROCEDURES.

a. RKDV-2A, No Radome Installed - Denver ARTCC (ZDV)/Rockville BOS (QJM) BFTA Program Test.

1. The ARTCC HCS operators will run the BFTA program on data received from the Rockville BOS (QJM).

2. The BFTA program printouts will be given to the SMOC personnel for analysis.

b. RKDV-2B, FGAR Installed - Denver ARTCC (ZDV)/Rockville BOS (QJM) BFTA Program Test.

1. The ARTCC HCS operators will run the BFTA program on data received from the Rockville BOS (QJM), after:

(a) The contractor has:

(1) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(2) Completed the First Article DQT.

(3) Completed the SAT.

(4) Completed the CAI.

(b) The FAA has:

(1) Completed alignment of the Mode S back-to-back antenna.

(2) Completed the recommissioning flight check.

2. The BFTA program printouts will be given to the SMOC personnel for analysis.

c. Data Analysis.

When the BFTA program has been run on beacon data without a radome and after the FGAR is installed, the SMOC personnel will compare the data to determine if there are any changes in the number and/or types of beacon false targets. Upon completion of the analysis, the SMOC personnel will submit a report to the TD.

7. TEST TITLE.

RKDV-3A/B Denver ARTCC (ZDV)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test

7.1 TEST OBJECTIVE.

The objective is to determine if there are any changes in the position of the beacon "parrot(s)"/Mode S Calibration Performance Monitoring Equipment (CPME), in the beacon data received from the Rockville BOS (QJM).

7.2 MOE.

The FGAR does not change the position of the beacon "parrot(s)"/Mode S CPMEs, in the data received by the ARTCC.

7.3 MOP.

The position of the beacon "parrot(s)"/Mode S CPMEs is the same.

7.4 EVALUATION CRITERIA.

The beacon "parrot(s)"/Mode S CPME positions are the same, before and after the FGAR is installed.

7.5 PROCEDURES.

a. RKDV-3A, No Radome Installed - Denver ARTCC (ZDV) COMDIG Program Test.

1. The ARTCC HCS operators will run the COMDIG program on data received from the Rockville BOS (QJM).

2. The COMDIG program printouts will be given to the SMOC personnel for analysis.

b. RKDV-3B, FGAR Installed - Denver ARTCC (ZDV) COMDIG Program Test.

1. The ARTCC HCS operators will run the COMDIG program on data received from the Rockville BOS (QJM), after:

(a) The contractor has:

(1) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(2) Completed the First Article DQT.

(3) Completed the SAT.

(4) Completed the CAI.

(b) The FAA has:

(1) Completed alignment of the Mode S back-to-back antenna.

(2) Completed the recommissioning flight check.

2. The COMDIG program printouts will be given to the SMOC personnel for analysis.

c. Data Analysis.

When the COMDIG program has been run on beacon data without a radome and after the FGAR is installed, the SMOC personnel will compare the data to determine if there are any changes in the position of the beacon "parrot(s)"/Mode S CPMEs. Upon completion of the analysis, the SMOC personnel will submit a report to the TD.

8. TEST TITLE.

RKKC-1A/B Kansas City ARTCC (ZKC) QARS Program Test

8.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the performance characteristics of the ATCRBS/Mode S beacon data received from the Rockville BOS (QJM).

8.2 MOE.

The FGAR does not affect the accuracy of the beacon data received from the ATCRBS/Mode S.

8.3 MOP.

The accuracy of the ATCRBS/Mode S beacon data being received by the ARTCC is the same, before and after the FGAR is installed.

8.4 EVALUATION CRITERIA.

There is no change in the accuracy of the beacon data received from the ATCRBS/Mode S, without a radome or with the FGAR installed.

8.5 PROCEDURES.

a. RKKC-1A, No Radome Installed - Kansas City ARTCC (ZKC) QARS Program Test.

1. The ARTCC HCS operators will run the QARS program on beacon data received from the Rockville BOS (QJM).

2. The QARS program printouts will be given to the TSS personnel for analysis.

b. RKKC-1B, FGAR Installed - Kansas City ARTCC (ZKC) QARS Program Test.

1. The ARTCC HCS operators will run the QARS program on beacon data received from the Rockville BOS (QJM), after:

(a) The contractor has:

(1) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(2) Completed the First Article DQT.

(3) Completed the SAT.

(4) Completed the CAI.

(b) The FAA has:

(1) Completed alignment of the Mode S back-to-back antenna.

(2) Completed the recommissioning flight check.

2. The QARS program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the QARS program has been run on beacon data without a radome and after the FGAR has been installed, the TSS personnel will compare the data to determine if there are any changes in the accuracy or any other anomalies. Upon completion of the analysis, the TSS personnel will submit a report to the TD, with copies of the QARS summary sheets.

9. TEST TITLE.

RKKC-2A/B Kansas City ARTCC (ZKC) Beacon False Target Analysis (BFTA) Program Test

9.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the number and/or types of beacon false targets, i.e., splits, ring-around, reflections, etc., in the ATCRBS/Mode S beacon data received from the Rockville BOS (QJM).

9.2 MOE.

The FGAR does not increase the number of beacon false targets included in the data received by the ARTCC.

9.3 MOP.

The number of beacon false targets are the same or less, after the FGAR is installed.

9.4 EVALUATION CRITERIA.

The number of beacon false targets in the data received by the ARTCC is either the same or less than the number received before the FGAR was installed.

9.5 PROCEDURES.

a. RKKC-2A, No Radome Installed - Kansas City ARTCC (ZKC) BFTA Program Test.

1. The ARTCC HCS operators will run the BFTA program on data received from the Rockville BOS (QJM).

2. The BFTA program printouts will be given to the TSS personnel for analysis.

b. RKKC-2B, FGAR Installed - Kansas City ARTCC (ZKC) BFTA Program Test.

1. The ARTCC HCS operators will run the BFTA program on data received from the Rockville BOS (QJM), after:

(a) The contractor has:

(1) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(2) Completed the First Article DQT.

(3) Completed the SAT.

(4) Completed the CAI.

(b) The FAA has:

(1) Completed alignment of the Mode S back-to-back antenna.

(2) Completed the recommissioning flight check.

2. The BFTA program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the BFTA program has been run on beacon data without a radome and after the FGAR is installed, the TSS personnel will compare the data to determine if there are any changes in the number and/or types of beacon false targets. Upon completion of the analysis, the TSS personnel will submit a report to the TD.

10. TEST TITLE.

RKKC-3A/B Kansas City ARTCC (ZKC) Common Digitizer Data Reduction (COMDIG) Program Test

10.1 TEST OBJECTIVE.

The objective is to determine if there are any changes in the position of the beacon "parrot(s)"/Mode S CPMEs, in the beacon data received from the Rockville BOS (QJM).

10.2 MOE.

The FGAR does not change the position of the beacon "parrot(s)"/Mode S CPMEs, in the data received by the ARTCC.

10.3 MOP.

The position of the beacon "parrot(s)"/Mode S CPMEs are the same.

10.4 EVALUATION CRITERIA.

The beacon "parrot(s)"/Mode S CPME positions are the same, before and after the FGAR is installed.

10.5 PROCEDURES.

a. RKKC-3A, No Radome Installed - Kansas City ARTCC (ZKC) COMDIG Program Test.

1. The ARTCC HCS operators will run the COMDIG program on data received from the Rockville BOS (QJM).

2. The COMDIG program printouts will be given to the TSS personnel for analysis.

b. RKKC-3B, FGAR Installed - Kansas City ARTCC (ZKC) COMDIG Program Test.

1. The ARTCC HCS operators will run the COMDIG program on data received from the Rockville BOS (QJM), after:

(a) The contractor has:

(1) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(2) Completed the First Article DQT.

(3) Completed the SAT.

(4) Completed the CAI.

(b) The FAA has:

(1) Completed alignment of the Mode S back-to-back antenna.

(2) Completed the recommissioning flight check.

2. The COMDIG program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the COMDIG program has been run on beacon data without a radome and after the FGAR is installed, the TSS personnel will compare the data to determine if there are any changes in the position of the beacon "parrot(s)"/Mode S CPMEs. Upon completion of the analysis, the TSS personnel will submit a report to the TD.

11. TEST TITLE.

RKMP-1A/B Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) QARS Program Test

11.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the performance characteristics of the ATCRBS/Mode S beacon data received from the Rockville BOS (QJM).

11.2 MOE.

The FGAR does not affect the accuracy of the beacon data received from the ATCRBS/Mode S.

11.3 MOP.

The accuracy of the ATCRBS/Mode S beacon data being received by the ARTCC is the same, before and after the FGAR is installed.

11.4 EVALUATION CRITERIA.

There is no change in the accuracy of the beacon data received from the ATCRBS/Mode S, without a radome or with the FGAR installed.

11.5 PROCEDURES.

a. RKMP-1A, No Radome Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) QARS Program Test.

1. The ARTCC HCS operators will run the QARS program on beacon data received from the Rockville BOS (QJM).

2. The QARS program printouts will be given to the TSS personnel for analysis.

b. RKMP-1B, FGAR Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) QARS Program Test.

1. The ARTCC HCS operators will run the QARS program on beacon data received from the Rockville BOS (QJM), after:

(a) The contractor has:

(1) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(2) Completed the First Article DQT.

(3) Completed the SAT.

(4) Completed the CAI.

(b) The FAA has:

(1) Completed alignment of the Mode S back-to-back antenna.

(2) Completed the recommissioning flight check.

2. The QARS program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the QARS program has been run on beacon data without a radome and after the FGAR has been installed, the TSS personnel will compare the data to determine if there are any changes in the accuracy or any other anomalies. Upon completion of the analysis, the TSS personnel will submit a report to the TD, with copies of the QARS summary sheets.

12. TEST TITLE.

RKMP-2A/B Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test

12.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the number and/or types of beacon false targets, i.e., splits, ring-around, reflections, etc., in the ATCRBS/Mode S beacon data received from the Rockville BOS (QJM).

12.2 MOE.

The FGAR does not increase the number of beacon false targets included in the beacon data received by the ARTCC.

12.3 MOP.

The number of beacon false targets are the same or less, after the FGAR is installed.

12.4 EVALUATION CRITERIA.

The number of beacon false targets in the data received by the ARTCC is either the same or less than the number received before the FGAR was installed.

12.5 PROCEDURES.

a. RKMP-2A, No Radome Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) BFTA Program Test.

1. The ARTCC HCS operators will run the BFTA program on data received from the Rockville BOS (QJM).

2. The BFTA program printouts will be given to the TSS personnel for analysis.

b. RKMP-2B, FGAR Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) BFTA Program Test.

1. The ARTCC HCS operators will run the BFTA program on data received from the Rockville BOS (QJM), after:

(a) The contractor has:

(1) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(2) Completed the First Article DQT.

(3) Completed the SAT.

(4) Completed the CAI.

(b) The FAA has:

(1) Completed alignment of the Mode S back-to-back antenna.

(2) Completed the recommissioning flight.

2. The BFTA program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the BFTA program has been run on beacon data without a radome and after the FGAR has been installed, the TSS personnel will compare the data to determine if there are any changes in the number and/or types of beacon false targets. Upon completion of the analysis, the TSS personnel will submit a report to the TD.

13. TEST TITLE.

RKMP-3A/B Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test

13.1 TEST OBJECTIVE.

The objective is to determine if there are any changes in the position of the beacon "parrot(s)"/Mode S CPMEs, in the beacon data received from the Rockville BOS (QJM).

13.2 MOE.

The FGAR does not change the position of the beacon "parrot(s)"/Mode S CPMEs, in the data received by the ARTCC.

13.3 MOP.

The position of the beacon "parrot(s)"/Mode S CPMEs are the same.

13.4 EVALUATION CRITERIA.

The beacon "parrot(s)"/Mode S CPME positions are the same, before and after the FGAR is installed.

13.5 PROCEDURES.

a. RKMP-3A, No Radome Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) COMDIG Program Test.

1. The ARTCC HCS operators will run the COMDIG program on data received from the Rockville BOS (QJM).

2. The COMDIG program printouts will be given to the TSS personnel for analysis.

b. RKMP-3B, FGAR Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) COMDIG Program Test.

1. The ARTCC HCS operators will run the COMDIG program on data received from the Rockville BOS (QJM), after:

(a) The contractor has:

(1) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(2) Completed the First Article DQT.

(3) Completed the SAT.

(4) Completed the CAI.

(b) The FAA has:

(1) Completed alignment of the Mode S back-to-back antenna.

(2) Completed the recommissioning flight check.

2. The COMDIG program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the COMDIG program has been run on beacon data without a radome and after the FGAR is installed, the TSS personnel will compare the data to determine if there are any changes in the position of the beacon "parrot(s)"/Mode S CPMEs. Upon completion of the analysis, the TSS personnel will submit a report to the TD.

14. TEST TITLE.

SMKC-1A/B Kansas City ARTCC (ZKC)/Samburg BOS (QPB) QARS Program Test

14.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the performance characteristics of the ATCRBS beacon data received from the Samburg BOS (QPB).

14.2 MOE.

The FGAR does not affect the accuracy of the beacon data received from the ATCRBS.

14.3 MOP.

The accuracy of the ATCRBS beacon data being received by the ARTCC is the same, before and after the FGAR is installed.

14.4 EVALUATION CRITERIA.

There is no change in the accuracy of the beacon data received from the ATCRBS, without a radome or with the FGAR installed.

14.5 PROCEDURES.

a. SMKC-1A, No Radome Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) QARS Program Test.

1. The ARTCC HCS operators will run the QARS program on beacon data received from the Samburg BOS (QPB).

2. The QARS program printouts will be given to the TSS personnel for analysis.

b. SMKC-1B, FGAR Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Program Test.

1. The ARTCC HCS operators will run the QARS program on beacon data received from the Samburg BOS (QPB), after the contractor has:

(a) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(b) Completed the SAT.

(c) Completed the CAI.

2. The QARS program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the QARS program has been run on beacon data without a radome and after the FGAR has been installed, the TSS personnel will compare the data to determine if there are any changes in the accuracy or any other anomalies. Upon completion of the analysis, the TSS personnel will submit a report to the TD, with copies of the QARS summary sheets.

15. TEST TITLE.

SMKC-2A/B Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Beacon False Target Analysis (BFTA) Program Test

15.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the number and/or types of beacon false targets, i.e., splits, ring-around, reflections, etc., in the ATCRBS beacon data received from the Samburg BOS (QPB).

15.2 MOE.

The FGAR does not increase the number of beacon false targets included in the data received by the ARTCC.

15.3 MOP.

The number of beacon false targets are the same or less, after the FGAR is installed.

15.4 EVALUATION CRITERIA.

The number of beacon false targets in the data received by the ARTCC is either the same or less than the number received before the FGAR was installed.

15.5 PROCEDURES.

a. SMKC-2A, No Radome Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) BFTA Program Test.

1. The ARTCC HCS operators will run the BFTA program on data received from the Samburg BOS (QPB).

2. The BFTA program printouts will be given to the TSS personnel for analysis.

b. SMKC-2B, FGAR Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) BFTA Program Test.

1. The ARTCC HCS operators will run the BFTA program on data received from the Samburg BOS (QPB), after the contractor has:

(a) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(b) Completed the SAT.

(c) Completed the CAI.

2. The BFTA program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the BFTA program has been run on beacon data without a radome and after the FGAR is installed, the TSS personnel will compare the data to determine if there are any changes in the number and/or types of beacon false targets. Upon completion of the analysis, the TSS personnel will submit a report to the TD.

16. TEST TITLE.

SMKC-3A/B Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Common Digitizer Data Reduction (COMDIG) Program Test

16.1 TEST OBJECTIVE.

The objective is to determine if there are any changes in the position of the beacon "parrot(s)," in the beacon data received from the Samburg BOS (QPB).

16.2 MOE.

The FGAR does not change the position of the beacon "parrot(s)," in the data received by the ARTCC.

16.3 MOP.

The position of the beacon "parrot(s)" are the same.

16.4 EVALUATION CRITERIA.

The beacon "parrot(s)" positions are the same, before and after the FGAR is installed.

16.5 PROCEDURES.

a. SMKC-3A, No Radome Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) COMDIG Program Test.

1. The ARTCC HCS operators will run the COMDIG program on data received from the Samburg BOS (QPB).

2. The COMDIG program printouts will be given to the TSS personnel for analysis.

b. SMKC-3B, FGAR Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) COMDIG Program Test.

1. The ARTCC HCS operators will run the COMDIG program on data received from the Samburg BOS (QPB), after the contractor has:

(a) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(b) Completed the SAT.

(c) Completed the CAI.

2. The COMDIG program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the COMDIG program has been run on beacon data without a radome and after the FGAR is installed, the TSS personnel will compare the data to determine if there are any changes in the position of the beacon "parrot(s)." Upon completion of the analysis, the TSS personnel will submit a report to the TD.

17. TEST TITLE.

SMME-1A/B Memphis ARTCC (ZME)/Samburg BOS (QPB) QARS Program Test

17.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the performance characteristics of the ATCRBS beacon data received from the Samburg BOS (QPB).

17.2 MOE.

The FGAR does not affect the accuracy of the beacon data received from the ATCRBS.

17.3 MOP.

The accuracy of the ATCRBS beacon data being received by the ARTCC is the same, before and after the FGAR is installed.

17.4 EVALUATION CRITERIA.

There is no change in the accuracy of the beacon data received from the ATCRBS, without a radome or with the FGAR installed.

17.5 PROCEDURES.

a. SMME-1A, No Radome Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) QARS Program Test.

1. The ARTCC HCS operators will run the QARS program on beacon data received from the Samburg BOS (QPB).

2. The QARS program printouts will be given to the TSS personnel for analysis.

b. SMME-1B, FGAR Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) QARS Program Test.

1. The ARTCC HCS operators will run the QARS program on beacon data received from the Samburg BOS (QPB), after the contractor has:

(a) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(b) Completed the SAT.

(c) Completed the CAI.

2. The QARS program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the QARS program has been run on beacon data without a radome and after the FGAR has been installed, the TSS personnel will compare the data to determine if there are any changes in the accuracy or any other anomalies. Upon completion of the analysis, the TSS personnel will submit a report to the TD, with copies of the QARS summary sheets.

18. TEST TITLE.

SMME-2A/B Memphis ARTCC (ZME)/Samburg BOS (QPB) Beacon False Target Analysis (BFTA) Program Test

18.1 TEST OBJECTIVE.

The objective is to determine if there are any differences in the number and/or types of beacon false targets, i.e., splits, ring-around, reflections, etc., in the ATCRBS beacon data received from the Samburg BOS (QPB).

18.2 MOE.

The FGAR does not increase the number of beacon false targets included in the beacon data received by the ARTCC.

18.3 MOP.

The number of beacon false targets are the same or less, after the FGAR is installed.

18.4 EVALUATION CRITERIA.

The number of beacon false targets in the data received by the ARTCC is either the same or less than the number received before the FGAR was installed.

18.5 PROCEDURES.

a. SMME-2A, No Radome Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) BFTA Program Test.

1. The ARTCC HCS operators will run the BFTA program on data received from the Samburg BOS (QPB).

2. The BFTA program printouts will be given to the TSS personnel for analysis.

b. SMME-2B, FGAR Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) BFTA Program Test.

1. The ARTCC HCS operators will run the BFTA program on data received from the Samburg BOS (QPB), after the contractor has:

(a) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(b) Completed the SAT.

(c) Completed the CAI.

2. The BFTA program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the BFTA program has been run on beacon data without a radome and after the FGAR has been installed, the TSS personnel will compare the data to determine if there are any changes in the number and/or types of beacon false targets. Upon completion of the analysis, the TSS personnel will submit a report to the TD.

19. TEST TITLE.

SMME-3A/B Memphis ARTCC (ZME)/Samburg BOS (QPB) Common Digitizer Data Reduction (COMDIG) Program Test

19.1 TEST OBJECTIVE.

The objective is to determine if there are any changes in the position of the beacon "parrot(s)," in the beacon data received from the Samburg BOS (QPB).

19.2 MOE.

The FGAR does not change the position of the beacon "parrot(s)," in the data received by the ARTCC.

19.3 MOP.

The position of the beacon "parrot(s)" are the same, after the FGAR is installed.

19.4 EVALUATION CRITERIA.

The beacon "parrot(s)" positions are the same, before and after the FGAR is installed.

19.5 PROCEDURES.

a. SMME-3A, No Radome Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) COMDIG Program Test.

1. The ARTCC HCS operators will run the COMDIG program on data received from the Samburg BOS (QPB).

2. The COMDIG program printouts will be given to the TSS personnel for analysis.

b. SMME-3B, FGAR Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) COMDIG Program Test.

1. The ARTCC HCS operators will run the COMDIG program on data received from the Samburg BOS (QPB), after the contractor has:

(a) Installed the FGAR and removed any scaffolding, cranes, etc., required for its installation.

(b) Completed the SAT.

(c) Completed the CAI.

2. The COMDIG program printouts will be given to the TSS personnel for analysis.

c. Data Analysis.

When the COMDIG program has been run on beacon data without a radome and after the FGAR is installed, the TSS personnel will compare the data to determine if there are any changes in the position of the beacon "parrot(s)." Upon completion of the analysis, the TSS personnel will submit a report to the TD.

20. LIST OF TEST TITLES.

LHAT-1	Lihue ATCT (LIH) Air Traffic Control Specialist (ATCS) Evaluation Test
LHAT-2	Honolulu CERAP (ZHN) Air Traffic Control Specialist (ATCS) Evaluation Test
LHEP-1A	No Radome Installed - Lihue Terminal Radar Facility (LIH) Electromagnetic Performance Test
LHEP-1B	FGAR Installed - Lihue Terminal Radar Facility (LIH) Electromagnetic Performance Test
LHHE-1	Lihue Terminal Radar Facility (LIH) Human Engineering Test
RKDV-1A	No Radome Installed - Denver ARTCC (ZDV)/Rockville BOS (QJM) QARS Program Test
RKDV-1B	FGAR Installed - Denver ARTCC (ZDV)/Rockville BOS (QJM) QARS Program Test
RKDV-2A	No Radome Installed - Denver ARTCC (ZDV)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test
RKDV-2B	FGAR Installed - Denver ARTCC (ZDV)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test
RKDV-3A	No Radome Installed - Denver ARTCC (ZDV)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test
RKDV-3B	FGAR Installed - Denver ARTCC (ZDV)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test
RKKC-1A	No radome Installed - Kansas City ARTCC (ZKC)/Rockville BOS (QJM) QARS Program Test
RKKC-1B	FGAR Installed - Kansas City ARTCC (ZKC)/Rockville BOS (QJM) QARS Program Test
RKKC-2A	No Radome Installed - Kansas City ARTCC (ZKC)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test
RKKC-2B	FGAR Installed - Kansas City ARTCC (ZKC)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test
RKKC-3A	No radome Installed - Kansas City ARTCC (ZKC)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test
RKKC-3B	FGAR Installed - Kansas City ARTCC (ZKC)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test
RKMP-1A	No radome Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) QARS Program Test
RKMP-1B	FGAR Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) QARS Program Test
RKMP-2A	No radome Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test

RKMP-2B	FGAR Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Beacon False Target Analysis (BFTA) Program Test
RKMP-3A	No radome Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test
RKMP-3B	FGAR Installed - Minneapolis ARTCC (ZMP)/Rockville BOS (QJM) Common Digitizer Data Reduction (COMDIG) Program Test
SMKC-1A	No radome Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) QARS Program Test
SMKC-1B	FGAR Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) QARS Program Test
SMKC-2A	No Radome Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Beacon False Target Analysis (BFTA) Program Test
SMKC-2B	FGAR Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Beacon False Target Analysis (BFTA) Program Test
SMKC-3A	No radome Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Common Digitizer Data Reduction (COMDIG) Program Test
SMKC-3B	FGAR Installed - Kansas City ARTCC (ZKC)/Samburg BOS (QPB) Common Digitizer Data Reduction (COMDIG) Program Test
SMME-1A	No Radome Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) QARS Program Test
SMME-1B	FGAR Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) QARS Program Test
SMME-2A	No Radome Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) Beacon False Target Analysis (BFTA) Program Test
SMME-2B	FGAR Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) Beacon False Target Analysis (BFTA) Program Test
SMME-3A	No radome Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) Common Digitizer Data Reduction (COMDIG) Program Test
SMME-3B	FGAR Installed - Memphis ARTCC (ZME)/Samburg BOS (QPB) Common Digitizer Data Reduction (COMDIG) Program Test

APPENDIX B
DATA ANALYSIS PROGRAMS

DATA ANALYSIS PROGRAMS

The programs that will be used to analyze the electromagnetic performance of the beacon and ASR-8 radar data are described below.

1. Beacon False Target Analysis (BFTA) Program.

   The BFTA program provides a tool to investigate and evaluate false target problems associated with the ATCRBS/Mode S. The BFTA program retrieves and processes beacon target information relative to all Mode 3/A beacon equipped aircraft detected during one job cycle of the program.

2. Common Digitizer Data Reduction (COMDIG) Program.

   The COMDIG program extracts selected types of data from a CDRECORD program tape, containing various mixtures of six difference CD message types received by the HCS, and prints the data in prescribed formats.

3. Quick Analysis of Radar Sites (QARS) Program.

   The QARS programs is divided into two sections: (1) Radar System Interface Verification, and (2) Radar Data Analysis Summary routine which analyzes the beacon tracks.

   a. Radar System Interface Verification.

      The following applicable parameters are supplied:

      1. Site identification.

      2. Beacon percentages.

         (a) Radar reinforced percentage

         (b) Mode 3/A validation percentage

         (c) Mode C validation percentage

         (d) Mode 2 validation percentage

      3. Status summary - provides the status of the primary and secondary radars, and the CD.

   b. Radar Data Analysis Summary.

      The following parameters are supplied:

      1. Adapted radar site name.

      2. Video - The receiver videos used for the CD input.

         (a) Beacon (BCN)

         (b) Moving Target Indicator (MTI)

         (c) Normal (NML)

         (d) Combined MTI and Normal video (SCH)

3. Scans -

   (a) Beacon - total number of antenna revolutions for the period of time the beacon return was tracked.

   (b) Surveillance - will vary according to a target's range and elevation.

4. Blip/Scan - The percentage ratio of the number of times a target was detected (BLIP) to the number of times it could have been detected (SCAN).

5. Radar Reinforced (R/R) - Ratio of number of beacon messages with the reinforced bit set to the total number of beacon messages received.

6. Collimation (COLL) - The collimation percentage for NML and MTI video.

7. Beacon split -

   (a) Azimuth Split (ASPLT)

   (b) Range Split (RSPLT)

8. False Beacon (FALSE-BCN) -

   (a) Ring-a-round (RAR)

   (b) Reflections (REF)

   (c) Code zero percentage (ZER)

9. Code Reliability -

   (a) Mode 3/A reliability percentage (M3REL)

   (b) Mode 3/A validity (M3VAL)

   (c) Mode C reliability percentage (MCREL)

   (d) Mode C validity (MCVAL)

10. Range - Beacon track start and stop histories.

11. Azimuth (AZ) - Beacon track start and stop histories.

12. Altitude (ALT) - Beacon track start and stop histories.

13. Deviation (DEV) - Mean difference of the predicted versus the actual position of a track.

14. Collimation Distribution - Variations of the closest surveillance return relative to the beacon return that was being tracked.

15. Permanent Echo (PE) Verification - Range of the adapted PEs in whole and eighths of a mile, together with the mean error in whole and tenths of Azimuth Change Pulses (ACP).

16. The mean predicted versus actual position of all the tracks for the site.

4. Transportable Radar Analysis Computer System (TRACS).

a. PLOTASR.

The PLOTASR program provides the capability to plot and sort aircraft and weather data in a polar presentation on an IBM compatible PC graphics display. The target data is retrieved from a CDRECORD disk file.

b. Real-Time Aircraft Display System (RTADS).

The RTADS program is a real-time hardware/software package that can record disseminated target data on an IBM compatible PC. The RTADS can handle three different formats, including CD-En Route and CD-Terminal.

c. TRACS Data Reduction (TDR).

The TRACS TDR is a set of computer analysis programs. The following programs will be used:

1. Beacon False Target Summary (BFTS).

The BFTS program analyzes false beacon targets for azimuth split, ring-around, uplink and downlink reflections, and other categories. The uplink reflections are used to calculate the location and orientation of the reflectors. Range versus azimuth, range versus elevation, and azimuth versus elevation plots are provided for false targets and beacon messages with ATCRBS/Mode S identifications (ID) of 0000.

2. Permanent Echo (PE) Accuracy.

This program analyzes the range and azimuth accuracy of the beacon messages for a specified PE transponder. The reference range and azimuth positions are inputted by the user.

3. Permanent Echo Accuracy Merge.

This program merges range azimuth accuracy statistics and plots for permanent echo PE transponders and produces trend plots.

4. Surveillance Analysis.

This program analyzes beacon and search performance on all beacon tracks. Statistics are given individually for each track and combined into ATCRBS, Mode S, and total categories. Range versus altitude and azimuth versus altitude plots are provided which contain track initiations, coasts, and drops.

APPENDIX C

TEST FORMS

ATCS EVALUATION QUESTIONNAIRE
TYPE II
FGAR OT&E OPERATIONAL TEST

BACKGROUND

The FAA is currently procuring replacement radomes for en route radar facilities and Beacon Only Sites (BOS). A number of the radomes designed to replace those at Air Route Surveillance Radar (ARSR)-1/2 and military type radar facilities have already been installed. As a part of this program, a radome designed for a BOS has been installed at the Lihue Terminal Radar Facility (LIH) to protect the Airport Surveillance Radar (ASR)-8 and Air Traffic Control Radar Beacon System (ATCRBS) antennas.

The radomes were developed and manufactured by the Electronic Space Systems Corporation (ESSCO), located in Concord, MA. Because the new radomes can affect the primary and secondary (beacon) radar electromagnetic antenna patterns, the FAA and ESSCO conducted an extensive Development Test and Evaluation (DT&E) program. There were no problems detected during DT&E that would affect either system's performance.

This questionnaire is looking for your evaluation of the displayed primary and secondary radar air traffic control (ATC) data. We are looking for any changes that may have occurred between what you were used to seeing before the radome was installed, to what you are seeing now.

The questionnaire is divided into three parts: Primary Radar Evaluation, Secondary (Beacon) Radar Evaluation, and Overall Evaluation. The questionnaire is very subjective - its main purpose is to detect any changes that should be addressed prior to integrating the new radomes into the National Air Space (NAS) system.

ATCS EVALUATION QUESTIONNAIRE
TYPE II
FGAR OT&E OPERATIONAL TEST

Test Number: LHAT-1

Test Title: Lihue ATCT (LIH) ATCS Evaluation Test

Test Site: Lihue Terminal Radar Facility (LIH)

Evaluator's Name: _____

PART I - PRIMARY RADAR EVALUATION

1. Has the detection of primary targets changed, i.e., more or less: target drops, detection at various altitudes, less detection as target range increases?

   YES/NO (circle one)

   Comments: _____

   _____

2. Have the displayed primary track trajectories changed, i.e., track histories: are they following a straight or arched path smoothly, or do they appear to be shifting back and forth in azimuth from scan to scan?

   YES/NO (circle one)

   Comments: _____

   _____

3. Have the number of primary false targets changed, i.e., false targets appearing more frequently or at undesirable locations?

   YES/NO (circle one)

   Comments: _____

   _____

4. Are the primary Permanent Echos (PE) where they were before?

   YES/NO (circle one)

   Comments: _____

   _____

PART II - SECONDARY (BEACON) RADAR EVALUATION

1. Has the detection of beacon targets changed, i.e., more or less: target drops, detection at various altitudes, less detection as target range increases?

   YES/NO (circle one)

   Comments: _____

   _____

2. Have the displayed beacon track trajectories changed, i.e., track histories: are they following a straight or arched path smoothly, or do they appear to be shifting back and forth in azimuth from scan to scan?

   YES/NO (circle one)

   Comments: _____

   _____

3. Have the number of beacon false targets changed, i.e., target splits, code swaps, incorrect code changes, false targets appearing more frequently, or at undesirable locations?

   YES/NO (circle one)

   Comments: _____

   _____

4. Are you experiencing any beacon target ring-around <u>not</u> seen before?

   YES/NO (circle one)

   Comments: _____

   _____

5. Are the beacon Permanent Echos (PE) where they were before?

   YES/NO (circle one)

   Comments: _____

   _____

6. Does the radar to beacon reinforcement appear the same?

   YES/NO (circle one)

   Comments: _____

   _____

PART III - OVERALL EVALUATION

1. Do you detect any degradation in the data displayed not experienced before?

   YES/NO (circle one)

   Comments: _____

   _____

2. Do you have any other comments about the performance of the primary (ASR-8) and/or secondary (ATCBI-4) since the FGAR was installed?

   YES/NO (circle one)

   Comments: _____

   _____

   _____

If you have any questions concerning this questionnaire or the Radome Replacement Program, contact Leonard Baker (609-485-5353) at the FAA Technical Center's, Communications/Navigation/Surveillance Engineering and Test Division, ACT-300, Atlantic City International Airport, New Jersey 08405.

Thank you for taking your time to provide us with this valuable information.

ATCS EVALUATION QUESTIONNAIRE
TYPE II
FGAR OT&E OPERATIONAL TEST

BACKGROUND

The FAA is currently procuring replacement radomes for en route radar facilities and Beacon Only Sites (BOS). A number of the radomes designed to replace those at Air Route Surveillance Radar (ARSR)-1/2 and military type radar facilities have already been installed. As a part of this program, a radome designed for a BOS has been installed at the Lihue Terminal Radar Facility (LIH) to protect the Airport Surveillance Radar (ASR)-8 and Air Traffic Control Radar Beacon System (ATCRBS) antennas.

The radomes were developed and manufactured by the Electronic Space Systems Corporation (ESSCO), located in Concord, MA. Because the new radomes can affect the primary and secondary (beacon) radar electromagnetic antenna patterns, the FAA and ESSCO conducted an extensive Development Test and Evaluation (DT&E) program. There were no problems detected during DT&E that would affect either system's performance.

This questionnaire is looking for your evaluation of the displayed primary and secondary radar air traffic control (ATC) data. We are looking for any changes that may have occurred between what you were used to seeing before the radome was installed, to what you are seeing now.

The questionnaire is divided into three parts: Primary Radar Evaluation, Secondary (Beacon) Radar Evaluation, and Overall Evaluation. The questionnaire is very subjective - its main purpose is to detect any changes that should be addressed prior to integrating the new radomes into the National Air Space (NAS) system.

ATCS EVALUATION QUESTIONNAIRE
TYPE II
FGAR OT&E OPERATIONAL TEST

Test Number: LHAT-2

Test Title: Honolulu CERAP (ZHN) ATCS Evaluation Test

Test Site: Lihue Terminal Radar Facility (LIH)

Evaluator's Name: _____

PART I - PRIMARY RADAR EVALUATION

1. Has the detection of primary targets changed, i.e., more or less: target drops, detection at various altitudes, less detection as target range increases?

   YES/NO (circle one)

   Comments: _____

   _____

2. Have the displayed primary track trajectories changed, i.e., track histories: are they following a straight or arched path smoothly, or do they appear to be shifting back and forth in azimuth from scan to scan?

   YES/NO (circle one)

   Comments: _____

   _____

3. Have the number of primary false targets changed, i.e., false targets appearing more frequently or at undesirable locations?

   YES/NO (circle one)

   Comments: _____

   _____

4. Are the primary Permanent Echos (PE) where they were before?

   YES/NO (circle one)

   Comments: _____

   _____

PART II - SECONDARY (BEACON) RADAR EVALUATION

1. Has the detection of beacon targets changed, i.e., more or less: target drops, detection at various altitudes, less detection as target range increases?

   YES/NO (circle one)

   Comments: _____

   _____

2. Have the displayed beacon track trajectories changed, i.e., track histories: are they following a straight or arched path smoothly, or do they appear to be shifting back and forth in azimuth from scan to scan?

   YES/NO (circle one)

   Comments: _____

   _____

3. Have the number of beacon false targets changed, i.e., target splits, code swaps, incorrect code changes, false targets appearing more frequently, or at undesirable locations?

   YES/NO (circle one)

   Comments: _____

   _____

4. Are you experiencing any beacon target ring-around <u>not</u> seen before?

   YES/NO (circle one)

   Comments: _____

   _____

5. Are the beacon Permanent Echos (PE) where they were before?

   YES/NO (circle one)

   Comments: _____

   _____

6. Does the radar to beacon reinforcement appear the same?

   YES/NO (circle one)

   Comments: _____

   _____

PART III - OVERALL EVALUATION

1. Do you detect any degradation in the data displayed not experienced before?

   YES/NO (circle one)

   Comments: _____

   _____

2. Do you have any other comments about the performance of the primary (ASR-8) and/or secondary (ATCBI-4) since the FGAR was installed?

   YES/NO (circle one)

   Comments: _____

   _____

   _____

If you have any questions concerning this questionnaire or the Radome Replacement Program, contact Leonard Baker (609-485-5353) at the FAA Technical Center's, Communications/Navigation/Surveillance Engineering and Test Division, ACT-300, Atlantic City International Airport, New Jersey 08405.

Thank you for taking your time to provide us with this valuable information.

TEST MISSION LOG
TYPE II
FGAR OT&E OPERATIONAL TEST

Date:_____

Test Number: _____

Test Title: _____

Test Location: _____

Test Team Members/Participants: (Name/Organization/Phone Number)

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1. Are there any open items, e.g., deviations from the test procedures, required regression testing, etc.?

_____

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_____

(Use additional sheets, if necessary)

2. The test objective(s) are listed in the appropriate paragraph of Appendix A, of the Test Procedures document.

3. The equipment configuration is described in the appropriate paragraph of Appendix A, of the Test Procedures document.

_____
Test Director (Name, Title, Organization)

TEST CONDUCT LOG
TYPE II
FGAR OT&E OPERATIONAL TEST

Date: _____

Test Number: _____

Test Title: _____

Test Location: _____

Record specific events, measurements, problems encountered, anomalies, and/or deficiencies, etc. Include a description of the test performed and any problems.

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Test Director (Name, Title, Organization)

FGAR-7/II

TEST SUMMARY LOG
TYPE II
FGAR OT&E OPERATIONAL TEST

Date:_____

Test Number: _____

Test Title: _____

Test Location: _____

Record any deviations from the test procedures noted in the Test Mission Log and/or the Test Conduct Log, a summary of the test conduct, a preliminary assessment of the test results, and any anomalies and/or deficiencies noted.

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Test Director (Name, Title, Organization)

FGAR-8/II

TEST DISCREPANCY REPORT (TDR)
TYPE II
FGAR OT&E OPERATIONAL TEST

TDR No. _____

Test Number: _____

Test Title: _____

Test Location: _____

Describe in detail, any problems, failures, etc., encountered during the test.

(Use additional sheets, if necessary)

_____ _____
Test Director (Name, Title, Organization) Date

FGAR-9/II

LHHE-1 HUMAN ENGINEERING TEST DATA SHEET
TYPE II
FGAR OT&E OPERATIONAL TEST

Date: _____

Test Number: LHHE-1

Test Title: Lihue Terminal Radar Facility (LIH) Human Engineering Test

Test Site: Lihue Terminal Radar Facility (LIH)

Description	Expected Result	Results (Yes/No)
Placing the ladder between the ASR-8 antenna and Zenith Hatch Assembly.	One person can place the ladder in position between the ASR-8 antenna and Zenith Hatch Assembly bar.	
Climbing from ASR-8 antenna to Zenith Service Hatch.	Personnel can safety climb from the ASR-8 antenna to the Zenith Service Hatch.	
Connecting safety harness.	Personnel can safety connect their safety harness to the anchor point.	
Performing maintenance on Zenith Hatch Assembly mounted equipment.	Personnel can safely perform maintenance on Zenith Hatch Assembly mounted equipment.	
Disconnecting safety harness.	Personnel can safely disconnect their safety harness.	
Climbing from Zenith Service Hatch to ASR-8 antenna.	Personnel can safely climb from Zenith Service Hatch to the ASR-8 antenna.	
Removing the ladder.	Personnel can safely remove and store the ladder from Zenith Hatch Assembly/ASR-8 antenna.	

LHHE-1 HUMAN ENGINEERING TEST DATA SHEET
TYPE II
FGAR OT&E OPERATIONAL TEST

COMMENTS: _____

_____

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_____

TEST EQUIPMENT

No test equipment is required for this test.

_____ _____
Operator (Name, Title, Organization) Date